

Basic Hydrologic Modeling System with HEC-HMS

November 1–3, 2004

Little Rock, Arkansas

Objectives

Participants will gain a practical knowledge of methods for simulation of runoff from storm rainfall, and how these methods are used to accomplish study goals. Methods relate to processing of historical and hypothetical (design-storm) rainfall data; estimation of losses (infiltration); transformation of rainfall excess to direct runoff with unit hydrographs; routing of flood waves; and calibration of model parameters. Experience will be gained in applying the methods with the new program Hydrologic Modeling System (HEC-HMS).

Monday

8:00 – 8:30 a.m.	Set-up and Handouts
8:30 - 8:45 a.m.	Introductions
8:45 - 9:30 a.m.	Lecture 1.1 Overview of Performing Project Studies Using Hydrologic Models Purpose and applications of storm-runoff modeling to accomplish study goals; overview of rainfall-runoff processes; description of how each technical subject relates to the overall task of model development, with consideration given to the intended use of the model.
9:30 – 9:45 a.m.	Break
9:45 – 10:30 a.m.	Lecture 1.2 Introduction to HEC-HMS Capabilities; data organization; basin schematic; data entry and editing; run setup and execution; output viewing.
10:30 - 12:00 Noon	Workshop 1.3 Using HEC-HMS Mechanics of program use: creating data sets, executing runs and viewing results.
12:00 - 1:00 p.m.	Lunch
1:00 - 1:30 p.m.	Review
1:30 - 2:20 p.m.	Lecture 1.4 Basin Rainfall Analysis Overview of types of rainfall data used in runoff computation; types and sources of gaged data; spatial averaging of rainfall data using (1) user-specified weights and (2) automated inverse-distance weighting.
2:30 - 3:20 p.m.	Lecture 1.5 Methods for Estimating Rainfall Loss Rates Definition of “loss rates”; initial/constant loss rate method; SCS Curve No. method; Green and Ampt method; pros and cons of methods.
3:20 - 4:30 p.m.	Workshop 1.6 Rainfall and Loss Rate Computation Part A: Analysis of an observed rainfall event; estimation of loss rate parameters. Part B: Comparison of different methods of spatially averaging rainfall.
4:30 p.m.	Adjourn

Tuesday

8:00 - 8:30 a.m.	Review
8:30-9:20 a.m.	Lecture 2.1 Hypothetical (Frequency-Based) Storms Use of NWS generalized rainfall data to develop frequency-based design storms; and hypothetical frequency curves.
9:20 - 9:40 a.m.	Break
9:40 - 10:30 a.m.	Lecture 2.2 Unit Hydrograph Approach to Rainfall-Runoff Modeling Development of unit hydrograph (UH) approach; definition of UH; application of UH; representation of baseflow.
10:40 - 1:30 a.m.	Lecture 2.3 Synthetic Unit Hydrograph Methods Definition of synthetic UH; Clark method; SCS method; selection of method; methods for estimating parameters. (Fleming)
11:30 - 12:00 p.m.	Workshop 2.4 Computing Hydrographs Using Synthetic Unit Hydrographs Part A: Development of unit hydrograph parameters for example watershed using standard methods; incorporation of these parameters into an HMS model, and evaluation of results using observed data. Part B: Comparison of different characterizations of subbasins with unit hydrographs.
12:00 – 1:00 pm	Lunch
1:00 – 2:00 p.m.	Workshop 2.4 continued
3:00 - 3:30 p.m.	Review
3:30 – 4:30 p.m.	Lecture 2.5 Introduction to Data Acquisition and Management for Hydrologic Modeling Data types, sources, and quality control; concept of centralized data repository; role of DSS in HMS.

Wednesday

8:00 - 8:50 a.m.	Lecture 3.1 Automatic Parameter Estimation Use of optimization feature to estimate unit hydrograph and loss rate parameters with observed rainfall and flow data.
8:50 - 9:10 a.m.	Break
9:10 - 11:00 a.m.	Workshop 3.2 Optimization Using HEC-HMS Use of HEC-HMS optimization feature to estimate unit hydrograph and loss rate parameters for example basin using rainfall information developed in a previous workshop.
11:00 - 11:30 a.m.	Review
11:30 - 12:30 p.m.	Lunch
12:30 - 1:45 p.m.	Lecture 3.3 Overview of Streamflow Routing Techniques Concepts of flood routing; nature and purpose; simplified methods; demonstration of simple flood routing procedures.
1:55 - 2:45 p.m.	Lecture 3.4 Selecting the Appropriate Routing Technique Description of available methods; basis for selecting method; demonstration of use of the routing methods discussed.
2:45 - 4:30 p.m.	Workshop 3.5 Streamflow Routing Using Different Methods Part A: Development of routing parameters for example basin using Muskingum Cunge and storage routing. Part B: Comparison of routing methods.
4:30 p.m.	Adjourn